

Film and Sheeting Materials

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Table 5. Barrier and Chemical Properties

	Water absorption, %	WVTR, nmol ^a /m · s	Gas permeability, nmol ^b /m · s · GPa			Resistance ^c to:					
			O ₂	CO ₂	N ₂	Organic					
						Acid	Alkali	Grease	solvent	Water	Sunlight
ABS	0.6–1.0		100	300	14–19	G–F	G	G	F–P	G	F
Cell.	45–115	0.1–32	1	1–100	0.2	P	P	G	P	F	G
CA	3–8.5	2.6–10	180–240	1700–2000	65–95	P	P	G	P	G	G
CTA	2–4.5	7.7–10	240	1800	65	F	P	G	F–P	G	G
ETFE	<0.02	0.4	160	500	65	G	G	G	G	G	G
FEP	<0.01	0.1	1200	3500	680	G	G	G	G	G	
PCTFE	nil	0.006	12–24	30–120	5.3	G	G	G	G	G	G
PTFE	nil	0.013				G	G	G	G	G	G
PVF	<0.5	2	4–8	20	0.5	G	G	G	G	E	E
ionomer	0.4	0.45	2400			G	G	G	G	G	G
nylon-6	9.5	2.7	4–6	20–24	1.9–2.5	P	F	E	G	G–P	F
PC	<0.8	2.8	480	1600	100	G	P	G	G–P	G	F
PET	0.25	0.3	6–8	30–50	1.4–1.9	G	P	G	G	G	F
PI	2.9		40–60	80	10	G	P	G	G	G	G
LDPE	<0.01	0.35	500–700	2000–4000	200–400	G	G	P	F	G	F
LLDPE	<0.01	0.2	250–600	1000–3000	150–600	G	G	F	F	G	F
MDPE	nil	0.09	200–400	1200–1400	80–120	G	G	G	G		
HDPE	nil					G	G	G	G	G	F
PMMA	0.3–0.4	0.32				G	G	P		G	G
PP	<0.005	3.2	300–500	1000–1600	60–100	G	G		G	G	F
PS	0.04–0.1	1.8	500–800	1400–3000		G	G		G–P	G	F
PVC rigid	nil	0.2–1.3	8–30	40–100		G	G		G–P	G	G
PVC plast.	nil	1.3–7.7	50–3000	160–5000		G	G		G–F	E	F

^a To convert nmol/(m · s) to (g · mm)/(m² · d), multiply by 1.55.^b To convert nmol/(m · s · GPa) to (cm² · mil)/m² · d · atm), multiply by 0.13.^c G = gppd; F = fair; P = poor.

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Table 4. Optical and Electrical Properties

Material	Refractive index	Transparency, %	Haze, %	Dielectric constant, kHz	Dissipation factor, kHz	Dielectric strength, kV/mm	Volume resistivity, $\Omega\text{m} \cdot \text{cm}$
ABS	1.53	33	100	2.75		14.3	10^{16}
cellophane			3.5	3.2	0.015	79.99	10^{11}
CA	1.50	88	<1	3.6	0.013	126–197	10^{10-15}
CTA				4.0	0.016	146	10^{13}
fluorocarbons-							
ETFE				2.6	0.0008	138	10^{10}
FEP	1.34	<90	4	2.25	<0.002	276	10^{19}
PCTFE	1.43			2.6	0.023	39–146	10^{12}
PTFE	1.35			4.1	0.0002	17	10^{13}
PVF				8.5	1.6	138	3×10^{13}
ionomer				2.4	0.002	39	10^{16}
nylon-6				3.7	0.03	50	
PC	1.59	83–90	0.5–2.0	2.9	0.0015	59	10^{16}
PET		88	1.0–3.0	2.8	0.005	296	10^{18}
PI				3.5	0.003	276	10^{18}
PE							
LDPE	1.51	0–75	4–50	2.2	0.0003	19	10^{16}
LLDPE			5–7				
MDPE	1.52	10–80	4–50	2.2	0.0003	20	10^{16}
HDPE	1.54	0.40	10–50	2.2	0.0005	20	10^{15}
UHMWPE	1.54				2.3×10^{-4}	51	10^{18}
PMMA	1.5	92	1	3.75	0.04	16	10^{15}
PP ^a			1.5–25	2.2	0.0002	276–400	3×10^{16}
PS ^b	1.6	87–92	0.1–30	2.5	0.0005	197	10^{16}
PVC							
rigid	1.53	76–82	8–18	3.0–3.3	0.013	17–50	10^{16}
plasticized				4.0–8.0	0.11	10–40	10^{11-14}

^a Biaxially oriented.

^b Oriented.

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